

## Use of Feed Supplements Producing Distinct Economic Gains with Young Animals

**Synthetic or replacement milk formulas effective . . . strong search for reasons for effects of antibiotic growth stimulators urged to provide better application**

BUFFALO, N.Y.—The use of growth stimulating feed supplements is producing distinct economic gains on the farm, according to several leading research men in that field. They told the 38th annual meeting of the American Association of Cereal Chemists here, May 24 to 28, that particularly profitable use can be made of some of these supplements in the early stages of the animals' growth.

**Nutrition of Baby Pigs.** Although a great deal of emphasis has been placed on high death losses of suckling pigs recently, poor and inefficient growth during this same period with subsequent low weaning weights is equally an important problem in efficient pork production according to B. E. Sheffy, Cornell University. Dr. Sheffy stressed the importance of early gains by pointing out

that from weaning to market weight 3.5 to 4 pounds of feed are required to produce a pound gain whereas during the suckling period only 1 to 2 pounds of feed is needed for each pound gained. Furthermore, there is a positive correlation between the weaning weight of pigs and the gains they make from weaning to market weight. Therefore, it is important that swinemen feed for fast gains during the suckling period by using palatable, well fortified creep feeds. Latest research indicates that pelleting and sugar coating increase palatability, the speaker concluded.

On the subject of antibiotics supplementation, Dr. Sheffy said there is ample evidence indicating their value when fed to growing swine, particularly early in life; greatest responses occur up to 100

to 120 pounds weight. New methods of supplying antibiotics to suckling pigs are being investigated. Arkansas workers reported growth responses from the implantation of antibiotic pellets behind the ears of baby pigs, he said. Similar tests at Cornell using bacitracin, penicillin, and aureomycin in progress do not indicate significant differences. While he pointed out that all the tests are not completed, observations to date show that bacitracin and penicillin pellets disappear within 24 hours while the aureomycin pellets appear to remain unchanged. Thus absorption is much more rapid than has heretofore been reported. Intramuscular injection of procaine penicillin G in oil where the absorption rate is slow has been reported to stimulate growth, however.

The development of synthetic sow's milk has opened a new field of research in baby pig nutrition. Early weaning and the use of a sow's milk replacement has in many cases produced good results. However, better than average equipment, skill, and care are needed to rear pigs this way successfully, Dr. Sheffy emphasized. Disease and sanitation problems cannot be treated lightly. Recent research indicates that it may be better to leave the pigs with the sows until they are a week to two weeks old when they can successfully be raised using a dry sow's milk replacement. This removes the element of wetness and reduces chilling losses. Disease and sanitation difficulties are also greatly reduced the speaker said. Recent experiments at Cornell show that pigs taken from the sow at from 10 to 14 days can be weaned in a few days to dry sow's milk replacement and a regular pelleted creep feed and will make excellent gains, reported Dr. Sheffy.

**Dairy Calf Nutrition.** In recent years the economic value of milk has encouraged the development of milk replacement formulas for raising dairy calves to the extent that the amount of fluid milk needed to raise these animals has been reduced from 400 to 25 pounds each, reported C. B. Knodt, Pennsylvania State College. When we consider

J. A. Anderson (left), retiring president of the AACC, in a between-sessions discussion with Frank Schwain, Procter and Gamble, newly designated president-elect, during the association's annual meeting



that over 7 million dairy calves are raised each year, it is easily seen that a significant contribution has been made to the supply of milk available for human consumption.

More research is needed on prenatal calf nutrition and on the nutritional requirements of young calves, declared Dr. Knodt, as is indicated by the high annual loss of dairy calves. As an example of the benefits of research, he pointed to studies of vitamin A which showed that calves from dams fed 1 million international units per day of vitamin A alcohol and acetate had higher blood levels of the vitamin, gained in body weight at a greater rate after birth, and had a lower incidence of scours than those whose dams were fed the same amount of vitamin A in alfalfa meal, or the control animals. Furthermore, it has been shown that feeding vitamin A-deficient rations to cows may result in abortion or birth of dead, weak, or blind calves.

In general, stated Dr. Knodt, requirements for thiamine, riboflavin, niacin, pyridoxine, pantothenic acid, and vitamin K are met by rations commonly used today in combination with synthesis by rumen bacteria. However, the development of new types of rations may require supplementation with some of these and other vitamins.

Research has been directed to the use of specific amino acids such as DL-methionine as supplements for the protein content of calf rations, he stated, but no beneficial effects or minimum requirements have been determined.

**Poultry Nutrition.** There is much that needs to be cleared up before it will be possible to speak with assurance as to the reasons for the effects of antibiotic growth stimulants in poultry feed, according to H. D. Branion, Ontario Agricultural College. On the matter of the use of pellets, for example, he pointed out that results of experiments with pigs, in which pellets were implanted behind the ear, could not be used as a basis for prediction of the effects of implantation in the back of the neck of a chicken, as there is a distinct difference in blood supply. The effects of antibiotics injection cannot be completely separated from feeding, as some of the product from injection gets into the bile and reaches the small intestine.

There is no doubt, declared Dr. Branion, that the ration fed to a hen has an effect on the chick, and he questioned the advisability of feeding antibiotics to hens producing eggs for hatching.

Not only antibiotics can change the flora of the intestines, Dr. Branion pointed out, for it has been known for a long time that variation of the type of carbohydrates or other diet elements can have a similar effect. He expressed reservations regarding some of the current contentions that antibiotics exert a sparing effect on vitamins. Any studies of this



Theodore C. Klumpp, president of Winthrop-Stearns Inc., addresses the opening session of the AACC meeting. Some excerpts from Mr. Klumpp's address on the care and feeding of businessmen appear in "Perspective," this issue, page 484

matter must be very careful to take into consideration all of the combinations of effects of variations in diet and conditions. Before the answer to the effects of antibiotics can be settled, he declared, the bacteriologists will have to be able to say just what the microorganisms involved need, use, and do.

Studies by Dr. Branion's group showed that with poultry in completely new quarters there was no growth response to antibiotics. After a few months inhabitation of the new quarters growth response began to appear. This suggested an infection, but none could be found. Even the most careful scrubbing and disinfection of the premises failed to eliminate the growth response.

**Enzymes.** At A. E. Staley Mfg. Co., Decatur, Ill., D. P. Langlois and G. C. Pinney found that complete control over the dextrose-to-maltose ratio in

high fermentable sirups is possible by the use of available commercial enzymes. This makes possible the variation of the properties of these sirups without changing their fermentability.  $\alpha$ -Amylase  $\beta$ -amylase, and amyloglucosidase used in varying ratios with or without acid hydrolysis have produced the desired results.

**Baking Technology.** Spices at levels commonly employed in baking exert a marked promoting action on gas production in simple systems but no significant effect in sweet doughs according to Wilma J. Wright, C. W. Bice, and J. M. Fogelberg. Crust color and volume of sweet roles are significantly improved by the presence of spices.

Harold N. Haney, Pillsbury Mills, in discussing the browning reaction in baked products, said that experiments with amino acids and dextrose solutions used as model systems indicate that all acids, with the exception of glutamic and proline, promote a browning reaction that may be measured fluorometrically or spectrophotometrically at 280 microns. Water extracts of bread crusts produced spectral curves identical to model systems. Mr. Haney suggested that this work, done in collaboration with John A. Johnson, Kansas State College, indicated that the browning of bread crust under constant conditions of temperature and pH may be regulated by the concentration of either the reducing sugar or the available amino groups. He said that the blocking of either carbonyl or  $\alpha$ -hydroxyl groups eliminated practically all browning in sugar cookies.

The addition of 5% defatted soy flour in bread making did not impair loaf volume, had no effect on mixing time, and, although it introduced a slight dough stickiness at the mixer, this did not carry through the fermentation under optimum conditions of oxidation. This study was reported by C. W. Ofelt and A. K. Smith of the Northern Regional Research Laboratory, USDA, and James Mills, Kansas Milling Co. No correlation was apparent between baking performance and the protein solubility of the soy flour.

#### On The Cover

### Improved Technology Is Playing Big Part in Modern Fertilizer Plants

THE AUTOMATIC weighing equipment, the belt conveyor, and other evidence of mechanized operation seen in the interior view of a fertilizer plant shown on the cover is significant of the trend in the industry today. Leaders in the field comment on the increasing application of chemical engineering technology in fertilizer production. In major plants, the day of the hand-shoveling and bagging is passing as the manufacturer of fertilizer feels the effect of the changes which

amount to a technical revolution.

We are depending increasingly on the scientific approach and on chemical materials to produce increasing food on our farm lands. Evidence indicates that the farmer is becoming increasingly aware of the value of fertilizer. Studies of potential show that crop production ceilings have not been approached. We are making progress toward the feeding of an increased population. Chemical technology in the fertilizer industry is playing its part.